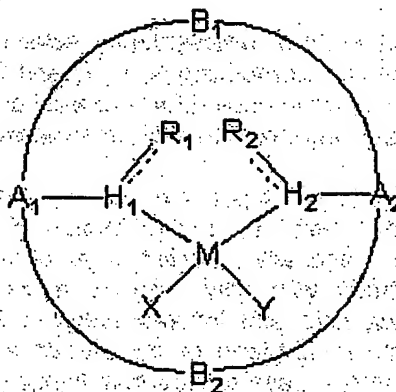


## CLAIMS

What is claimed is:

1. A composition of matter comprising a metal complex having the following general formula:



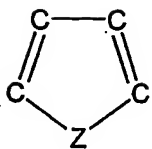
Formula I

wherein:

$B_1$  and  $B_2$  may be same or different and are selected from -Ar-, T-Ar-, -T-Ar-T- and -T-, wherein Ar is an aromatic ring;

T is a saturated or unsaturated, cyclic or acyclic, chiral or achiral hydrocarbon group with from 1 to 10 carbon atoms and one or more carbons in T may be replaced with one or more heteroatoms or groups selected from O, S, SO, SO<sub>2</sub>, NR<sub>3</sub>, where R<sub>3</sub> is H, alkyl (C1-4), cycloalkyl (C3-6), aryl, aralkyl and acyl (C2-6); or (SiR<sub>4</sub>R<sub>5</sub>)<sub>n</sub>, where n is 1 or 2 and -Si(R<sub>4</sub>R<sub>5</sub>)-O-Si(R<sub>4</sub>R<sub>5</sub>)-, where R<sub>4</sub> and R<sub>5</sub> may be same or different and are selected from alkyl (C1-4), cycloalkyl (C3-6), aryl and aralkyl;

$A_1$  and  $A_2$  may be same or different and is a saturated or unsaturated, substituted or unsubstituted, chiral or achiral cyclic ring structure, for example, a cycloalkyl or



where, Z is selected from O, NR<sub>3</sub>, S, CR<sub>6</sub>=CR<sub>7</sub>, CR<sub>6</sub>=N and N=CR<sub>6</sub> and when R<sub>6</sub> and R<sub>7</sub> are H, then the ring may be optionally substituted with one or more substituents, Q, selected from H, alkyl, alkoxy, amino, carboxy, cyano, halo, hydroxy, nitro and trifluoromethyl and R<sub>6</sub> and R<sub>7</sub> may further combine to form a cyclic ring, optionally substituted with one or more heteroatoms selected from O, N and S and may contain at least one doublebond;

H<sub>1</sub> and H<sub>2</sub> are independently selected from any one of the heteroatoms comprising N, P, O and S and these heteroatoms can be either in neutral form or exist as the corresponding anion when protons linked to said heteroatoms are removed;

R<sub>1</sub> and R<sub>2</sub>, connected to H<sub>1</sub> and H<sub>2</sub> through either a single bond, a double bond or a combination of both, may be same or different and are selected from alkyl, aryl, aralkyl, optionally substituted with alkyl, alkoxy, amino, carboxy, cyano, halo, hydroxy, nitro and trifluoromethyl or R<sub>1</sub> and R<sub>2</sub> may combine through an alkylene or substituted alkylene bridge to form a cyclic ring in case of bidentate ligands (Appendix 1) and one or more methylene groups of said alkylene bridge may be substituted with an heteroatom, G, selected from O, P, S and N or an heterocyclic ring containing such an heteroatom in case of tridentate ligands;

R' and R'' are alkyl, alkenyl, aryl, aralkyl and cycloalkyl;

X and Y are selected from halogens, pseudo-halogens, carboxylic acid esters, amino, substituted amino, alkoxy or aryloxy group; and

M is a transition group metal ion or a main group metal ion and is selected based on the type of ligand and comprise Fe, Ru, Os, Rh, Ir, Ni, Pd, Pt, Cu, Zn, Al, Ti, Zr, Hf, V, Nb, Ta, Cr, Mo and W.

- 1 2. A composition according to Claim 1 wherein the aromatic ring AR is
- 2 selected from the group consisting of: phenyl, furyl, thienyl, pyrrolyl, indolyl,
- 3 isoindolyl, pyridyl and naphthyl.

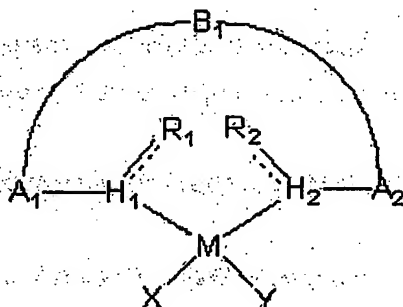
1 3. A composition according to Claim 1 wherein B<sub>1</sub>, B<sub>2</sub>, A<sub>1</sub> and A<sub>2</sub>  
 2 comprise phenyl rings and the linkages from B<sub>1</sub> to B<sub>2</sub> to A<sub>1</sub> to A<sub>2</sub> to  
 3 B<sub>1</sub> are through either the 1,3 or 1,4 positions of each ring moiety.

1 4. A composition according to Claim 1 wherein B<sub>1</sub>, B<sub>2</sub>, A<sub>1</sub> and A<sub>2</sub>  
 2 comprise a heterocyclic ring.

1 5. A composition according to Claim 4 wherein the heterocyclic  
 2 ring has 5 members and wherein the linkages B<sub>1</sub> to B<sub>2</sub> to A<sub>1</sub> to A<sub>2</sub> to  
 3 B<sub>1</sub> are through any of C<sub>2</sub>-C<sub>5</sub>.

1 6. A composition according to Claim 4 wherein the heterocyclic  
 2 ring has 6 members and wherein the linkages B<sub>1</sub> to B<sub>2</sub> to A<sub>1</sub> to A<sub>2</sub> to  
 3 B<sub>1</sub> are through any of C<sub>2</sub>-C<sub>6</sub>.

1 7. A composition having General Formula I of Claim 1 wherein B<sub>2</sub> is  
 2 absent, such composition having General Formula II, as follows:

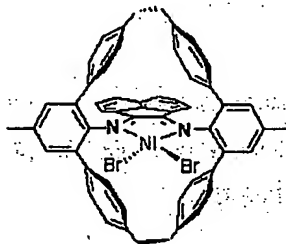


Formula II

- 1 8. A composition according to Claim 1 wherein the complex comprises a  
2 cyclophane-based Ni<sup>II</sup>- $\alpha$ -diimine complex.

- 1 9. A composition according to Claim 8 having Formula III as follows:

2



3

- 1 10. A method for preparing an polymer, said method comprising the step  
2 of:  
3 A) reacting at least one monomer or prepolymer in the presence of  
4 a catalyst comprising a composition according to Claim 1.
- 1 11. A method according to Claim 10 wherein at least a portion of the  
2 reaction in Step A occurs at temperatures in excess of approximately 50°C.
- 1 12. A method according to Claim 10 wherein the polymer is a polyethylene.
- 1 13. A method according to Claim 10 wherein the polymer is a polyolefin.
- 1 14. A method according to Claim 10 wherein the method comprises a gas  
2 phase polymerization.